REMARKS

Claims 1-3, 6 and 8-17 are pending. Claim 32 is added, which depends from claims 1 or 17. Claim 1 is an independent claim from which claims 2-3, 6 and 8-16 depend. Claim 17 also is an independent claim.

Claims 1-3, 6 and 8-17, previously allowed, are now rejected as being anticipated by the newly cited JP 55-094,750 patent (JP '750).

Claims 6, 8, 11 and 13-16 are rejected as being unpatentable over the JP '750 patent.

JP'750 describes resin-coated sand for shell core molding produced by coating the surface of a molding sand with a thermosetting resin, and then further coating, with a thermoplastic resin, the surface of the molding sand coated with the thermosetting resin (Claim 1). In the Examples of JP'750, only vinyl acetate or acrylic resin is employed as the thermoplastic resin.

In JP'750, the resin-coated sand for shell core molding is produced in accordance with the following method (based on the passage from page 1, right column, line 17, to page 2, upper left column, line 15). First, the surface of molding sand, used as core sand, is coated with a thermosetting resin by adding a mixture of a thermosetting resin such as phenol resin or furan resin and a solvent thereof to the molding sand, and thereafter vaporizing the solvent. Subsequently, the surface of the sand coated with the thermosetting resin is further coated with a thermoplastic resin such as styrene resin, acrylic resin, or vinyl acetate by adding a mixture of powder of the thermoplastic resin and a solvent thereof such as methylene chloride, trichloroethane, trichloroethylene, ethyl acetate, acetone, or toluene, and then vaporizing the solvent. As a result, resin- coated sand for shell core molding is produced which has a double coating structure with an inner coating layer formed from the thermosetting resin and an outer coating layer formed from the thermoplastic resin is produced.

The method for producing the resin coating sand described in JP'750 is termed a cold coating process.

In addition, in JP'750, a shell core is produced and used in accordance with the following method (based on the passage from page 2, upper right column, line 1, to page 2, lower

left column, line 3). First, the aforementioned resin-coated sand is packed into a core box having a specified pattern cavity part which has been heated at approximately 300°C. The resin-coated sands are thereby integrally bonded and solidified by adhesion by means of the thermosetting resin which has been melted by means of the heat of the core box. At the same time, the thermoplastic resin of the resin-coated sand melts from the heat of the core box, so that the thermoplastic resin is interspersed and dispersed in the aforementioned thermosetting resin. Therefore, the thermoplastic resin does not impair the bonding power of the thermosetting resin. As a result, a shell core molded in a specified shape can be obtained by bonding the resin-coated sand mainly by virtue of the adhesive effects of the thermosetting resin.

The obtained shell core is taken out of the core box and is placed in a mold, followed by pouring of molten metal (aluminum) at approximately 700° C. The shell core can maintain its shape due to the thermal resistance and bonding power of the thermosetting resin when the molten metal is poured into the mold. However, as time elapses, the thermoplastic resin is thermally decomposed due to the heat of the aluminum, and disappears.

As is described above, the thermoplastic resin employed in JP'750 may be a styrene resin, acrylic resin, or vinyl acetate. This resin does not disappear at approximately 300°C during the production of a shell core, but gradually disappears at approximately 700°C during molding. In other words, the thermoplastic resin employed in JP'750 may disappear at temperatures ranging from approximately 300°C to approximately 700°C.

In contrast, as set forth in independent claim 1, the thermoplastic resin employed in the present invention is at least partially removed at 200°C for 1 to 7 hours. In addition, as is described in the specification of the present application (page 9, the first and fourth paragraphs), the thermoplastic resin can at least disappear partially from the resin-coated sand during secondary baking of heating at 170 to 250°C for several hours. Therefore, the thermoplastic resin employed in the present invention is substantially different from the thermoplastic resin disclosed in JP'750.

The difference between the resin coated sand of Yuyama and that of the invention also is clear when the respective methods of making them are considered. As is described above, the resin-coated sand of JP'750 is produced by the "cold coating process", in which the thermosetting resin

and the solvent thereof are added to the core sand, followed by vaporization of a solvent, and subsequently, the thermoplastic resin and a solvent thereof are added thereto, followed by vaporization of the solvent.

On the other hand, in the present invention, the resin-coated sand is produced by means of a "dry hot method", in which core sand generally is heated to 130 to 150°C is placed in a mixer, the core sand is then coated with the molten thermosetting resin, hexarnethylenetetramine is added thereto as a curing agent, the coated sand is then coated with the molten thermoplastic resin, and calcium stearate is added thereto as a flow improver.

Therefore, the method for producing the resin-coated sand of the present invention is different from that of JP'750. If a solvent were to be employed in the present invention, if the solvent were not completely removed, problems would arise in that sufficient strength could not be obtained, the fusion point would be reduced, stickiness would be exhibited, and it would be difficult to form a mold. This further shows that the resin coated sand of each of Yuyama and the invention are different.

To further demonstrate the differences, JP'750 relates to the resin-coated sand for shell core molding, and the mold formation step thereof is different from that of the present invention. In JP'750, a mold (shell core) is formed by thermally curing the resin-coated sands. On the other hand, in the present invention, a mold is formed by subjecting the resin-coated sands to shaping by laser irradiation, followed by secondary baking. Therefore, the mold formation step using resin-coated sands is different between the present invention and JP'750. This further shows the differences.

For reasons described above, the resin-coated sand recited in independent claim 1 and claim 17 of the present application is novel with respect to JP '750 in view of the types of thermoplastic resin. That is, claim 1 distinguishes on the basis of the limitation that the resin can be at least partially removed at 200°C for 1 to 7 hours. Claim 17 distinguishes on the basis of specifically reciting the resin polyethylene, polypropylene, polyethylene glycol and polyamide. A new claim 32 which depends from claims 1 or 17 recites that the thermoplastic resin is at least one of polyethylene, polypropylene, polyethylene glycol and polyamide is added by the amendments

since JP '750 fails to disclose or suggest that polyethylene, polypropylene, polyethylene glycol and polyamide can be employed as the thermoplastic resin. Applicant notes that when vinyl acetate employed in Examples of JP '750 as the thermoplastic resin is employed, a bad odor occurs during secondary baking, and for this reason, it is not practical to use vinyl acetate as the thermoplastic resin.

As is described above, the present invention is not disclosed in JP '750. Therefore the anticipation rejection of independent claim 1 and its dependent claims and independent claim 17 fails. These claims recite novel and advantageous subject matter and should be allowed.

As to the obviousness rejection of claims 6, 8, 11 and 13-16, which depend directly or ultimately from claim 1, these add further novel features of the invention. Therefore, these claims also are patentable and should be allowed.

The other art cited has been considered and is not deemed pertinent.

Prompt and favorable action is requested.

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